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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/803,876	03/19/2004	Eiji Ogawa	Q80555	7156
23373 7590 07/13/2007 SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037			EXAMINER WEATHERBY, ELLSWORTH	
			ART UNIT 3768	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/803,876

Applicant(s)

OGAWA, EIJI

Examiner

Ellsworth Weatherby

Art Unit

3768

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12/11/2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 09/07/2005.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments with respect to claims 1-17 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-10 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Trucco et al. (PGPub. No. 2005/0033167 A1).

Trucco et al. '167 teaches an ultrasonic transmitting and receiving apparatus comprising: an ultrasonic array including plural ultrasonic transducers for transmitting ultrasonic waves and receiving ultrasonic echoes reflected from an object to be inspected (abstract); drive signal generating means for generating drive signals for respectively driving the plural ultrasonic transducers (abstract); transmission control means for controlling the drive signal generating means such that ultrasonic waves transmitted from the plural ultrasonic transducers form at least one ultrasonic beam [0090-0091]; signal processing means for performing reception focusing processing on plural detection signals obtained based on the ultrasonic echoes received by the plural

Art Unit: 3768

ultrasonic transducers so as to form a reception focal point in at least within the object thereby obtaining plural detection signals relating to the at least one region [0009]; and calculating means for calculating image data relating to the at least one region on the basis of the plural detection signal relating to the at least one region and the plural different acoustic pressure intensity profiles [0044]. Trucco et al. '167 also teaches that the plural different acoustic pressure intensity profiles represent one of acoustic pressure intensity and acoustic pressure intensity ratios in plural regions included in an isochronal surface as a surface where ultrasonic beams reach in a predetermined time elapsed from being transmitted [0005; 0008; 0011; 0039]. Trucco et al. '167 also teaches optimizing the scan to image a plurality of regions along a depth range that also includes a focusing depth [0009; 0035-0036]. Trucco et al. '167 also describes optimized beam patterns for each of a plurality of penetration depths [0037]. Trucco et al. '167 also teaches that the calculating means calculates the image data by obtaining a solution of simultaneous equations which have image data relating to said at least one region as unknown and which are constructed based on the plural detection signals relating to said at least one region and plural acoustic pressure intensity profiles relating to said at least one region [0056-0057]. Trucco et al. '167 also teaches that calculating means calculates the image data by obtaining a solution of simultaneous equations which have components corresponding to image data relating to said at least one region as unknowns and which are constructed based on the plural detection signals relating to said at least one region and plural acoustic pressure intensity profiles relating to said at least one region [0058-0064].

Trucco et al. '167 does not expressly teach a storage means for storing plural different acoustic pressure intensity distribution formed by transmitting ultrasonic beams and the reception focusing processing to be performed in the signal processing means. However, It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Trucco et al. '167 to include a storage means. The motivation to modify Trucco et al. '167 to include a storage means would have been to allow for repeated examinations.

4. Claims 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Trucco et al. '167 in view of Drukarey et al. (USPN 5,105,814).

Trucco et al. '167 teaches all the limitations of the claimed invention except for expressly teaching that the calculating means calculates the image data by obtaining vector "x" from an equation  $Ax=b$  where "b" represents a vector having components corresponding to the plural detection signals relating to the at least one region, "A" represents a matrix having components corresponding to plural acoustic pressure intensity ratios in plural acoustic pressure intensity profiles relating to the at least one region, and "x" represents a vector having components corresponding to image data relating to the at least one region.

In a similar field, Drukarey et al. 814 teaches a calculating means that calculates image data by obtaining vector "x" from an equation  $Ax=b$  where "b" represents a vector having components corresponding to the plural detection signals relating to the at least one region, "A" represents a matrix having components corresponding to plural acoustic

pressure intensity ratios in plural acoustic pressure intensity profiles relating to the at least one region, and "x" represents a vector having components corresponding to image data relating to the at least one region. using (col. 9, lines 23-67; col. 10, lines 1-52).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Trucco et al. '167 in view of Drukarey et al. '814. The motivation to modify Trucco et al. '167 would have been to calculate image data through the use of simple, linear algebra.

5. Claims 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Trucco et al. '167 in view of Drukarey et al. '814 as applied to claim 11 above, and further in view of Ebbini et al. (PGPub. No. 2003/0212326 A1).

Trucco et al. '167 in view of Drukarey et al. '814 teaches all the limitations of the claimed invention except for expressly teaching that the calculating means obtains the vector "x" by obtaining a generalized inverse matrix of the matrix "A" which satisfies the equation  $Ax=b$ . Trucco et al. '167 in view of Drukarey et al. '814 also does not expressly teach that the calculating means obtains the vector "x" by performing singular value decomposition on the matrix "A", reducing a rank of the matrix "A" by discarding singular values less than a predetermined value, and obtaining a generalized inverse matrix of the matrix A' which has a reduced rank. Trucco et al. '167 in view of Drukarey et al. '814 also does not expressly teach that the calculating means obtains a least square solution of the vector "x" which satisfies the equation  $Ax=b$  in the case where the matrix "A" have

"m" rows and "n" columns where  $m > n$ . Trucco et al. '167 in view of Drukarey et al. '814 also does not teach a calculating means that obtains the vector "x" by obtaining an inverse matrix  $A^{-1}$  of the matrix "A" in accordance with one of (i) an exact method including a sweeping-out method and (ii) an iterative method in the case where the matrix "A" is a square matrix and a regular matrix.

Ebbini et al. '326 teaches a calculating means that obtains the vector "x" by obtaining a generalized inverse matrix of the matrix "A" which satisfies the equation  $Ax=b$  [0100]. Ebbini et al. '326 also teaches a calculating means obtains the vector "x" by performing singular value decomposition on the matrix "A", reducing a rank of the matrix "A" by discarding singular values less than a predetermined value, and obtaining a generalized inverse matrix of the matrix A' which has a reduced rank [0101-0103]. Ebbini et al. '326 also teaches a calculating means that obtains a least square solution of the vector "x" which satisfies the equation  $Ax=b$  in the case where the matrix "A" have "m" rows and "n" columns where  $m > n$  [0099].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Trucco et al. '167 in view of Drukarey et al. '814. The motivation to modify would have been to use simple linear algebra to simplify the calculations by the calculating unit.

6. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Trucco et al. '167 in view of Ebbini et al. '326

Trucco et al. '167 teaches error margins corresponding to variable isochronal surfaces. However, Trucco et al. '167 does not expressly teach a correction means for correcting acoustic pressure intensity profiles corresponding to a second isochronal surface based on detection signals relating to a predetermined region and acoustic pressure intensity profiles corresponding to a first isochronal surface.

Ebbini et al. '326 teaches a correction means for correcting acoustic pressure intensity profiles corresponding to a second isochronal surface based on detection signals relating to a predetermined region and acoustic pressure intensity profiles corresponding to a first isochronal surface [0069].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Trucco et al. '167 with Ebbini et al. '326. The motivation to modify Trucco et al. '167 with Ebbini et al. '326 would have been to provide the most accurate data without additional data acquisition.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ellsworth Weatherby whose telephone number is (571) 272-2248. The examiner can normally be reached on M-F 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eleni Mantis-Mercader can be reached on (571) 272-4740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 3768

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EW



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